PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

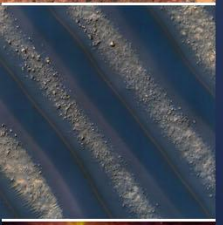
Environmental Regulations as Drivers of Materials Obsolescence

November 2010

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

RRAC PC Overview

- NASA's Agency-wide resource for identifying and managing risks associated with changing environmental regulations
- RRAC Goals
  - Proactively detect, analyze and communicate environmental regulatory risks to NASA mission areas and supporting facilities
  - Communicate with regulators and collaborate with other stakeholders in the mitigation of such risks
  - Provide centralized support on emerging regulations and other activities to NASA HQ Environmental Management Division

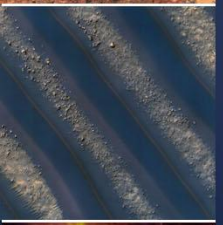





PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

What does that have to do with materials…?

Everything!



PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Materials

1. the elements, constituents, or substances of which something is composed or can be made
2. matter that has qualities which give it individuality and by which it may be categorized

<sticky material>

<explosive materials>

…merriam-webster.com

Obsolescence

A decline in the value of equipment or of a product brought about by an introduction of new technology or by changes in demand.

…New Dictionary of Cultural Literacy
bartleby.com

Materials Obsolescence

the (*sometimes sudden*) inability to continue to obtain or use (*sometimes critical*) coatings, solvents, foams and other materials due to one or more obsolescence factors.

Often accompanied by *frustration and anguish* in the space flight technical community.

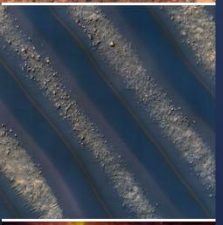
PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Materials Obsolescence: Drivers

- Government Laws & Regulations
  - Environmental
  - Occupational Safety
- Natural Resource Limitations
- Flight Safety Hazards
- Outdated Technology
- Vendor Economics
- Natural Disaster

RRAC PC

- **Regulatory Early Warning System**
- **Risk Reality Check**
- **Proactive Regulatory Risk Mitigation**



PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Materials Obsolescence: Regulatory Risk Management

Regulatory Early Warning System

- **Agency-wide <u>regulatory analysis and communication</u>**
  - Review, track, analyze emerging regulations
  - Evaluate potential impacts to both Programs and Facilities
  - Communicate significant regulatory changes to the NASA Community

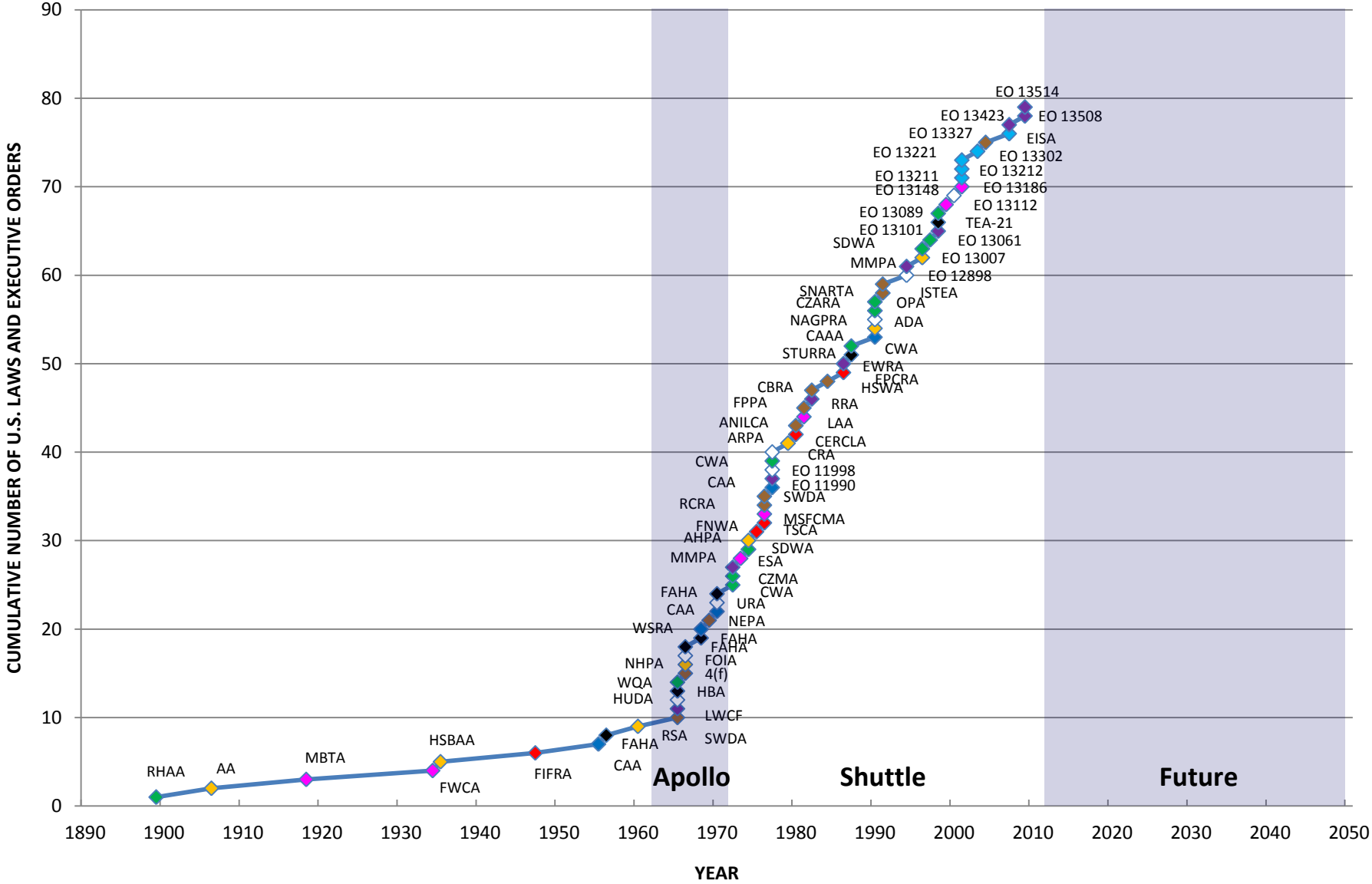
Risk Reality Check

- **<u>Collaborate with NASA technical community</u> on regulatory risk analysis and interpretation**

Proactive Regulatory Risk Mitigation

- **<u>Represent NASA interests to regulatory agencies</u>**
  - Advocate with regulators during rulemaking efforts to mitigate mission risks
  - When necessary, work with NASA technical community to seek regulatory relief

Evolution of U.S. Environmental Requirements



7

Regulatory Analysis and Issue Communication
Sources

- "Official" Sources
  - Executive Orders
  - Congressional statements, legislative bills
  - Federal Register and Regulatory Agenda
  - Reports, policies, and other non-regulatory actions of Federal agencies
  - State regulatory notices
  - Other countries and international organizations
- Other Sources
  - Regular communication with regulators
  - Partnerships and networks with other stakeholders, especially other Federal agencies
  - Industry concerns
  - Global trends

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Regulatory Analysis and Issue Communication: *Typical communication process*

- Identify and communicate emerging regulatory changes and associated potential risks to the affected NASA Community
  - Biweekly Updates
  - General alerts and summaries
  - Targeted technical overviews
  - Participation in technical working groups
- Evolving applicability and relevance guidelines
  - Programmatic
    - ❖ space vehicles, payloads, aeronautics
    - ❖ direct and indirect impacts
    - ❖ critical supply chain issues
  - Facilities
    - ❖ NASA Centers
    - ❖ other processing facilities
    - ❖ emergency landing sites abroad

National Aeronautics and
Space Administration

Principal Center for Regulatory Risk Analysis and Communication

Regulatory Tracking Summary

24 September 2010

This report summarizes regulatory items reviewed by the NASA RRAC PC. Items that appeared to have limited interest to the NASA community, or are provided for information only, are shown in light gray text. Notes and comments by the RRAC PC are shown in bold, blue text under "Description." Related documents and citations, such as "71 FR 51967," are linked to the appropriate document for quick access. Suggested follow-up actions are noted with significant items; users are advised that other follow-up actions may be appropriate for their program or facility. Previous issues of this regulatory summary are archived on the RRAC PC website at http://www.nasa.gov/offices/rrac/home/. Comments, questions, suggestions, and requests for further information should be directed to the RRAC PC Manager, Sharon Scroggins at 256-544-7932 (sharon.scroggins@nasa.gov).

National Aeronautics and
Space Administration

Principal Center for Regulatory Risk Analysis and Communication

REGULATORY ALERT

ECHA Proposed SVHCs

This information was prepared by NASA's
archive of regulatory alerts, summaries, a
http://www.nasa.gov/offices/rrac/home/.
Scroggins/MSFC (256-544-7932, sharon.

Date [Reference]: 30 August 2010 [Pro

Regulatory Agency: European Chemic

Rulemaking Type: Proposal

Title: Proposal to Name Eleven Chemic

Summary:

On 30 August 2010, the European Chem
very high concern (SVHCs). SVHCs are
Author
potenti
carcinc
bioacc
their p

1,2,3-T

National Aeronautics and
Space Administration

Principal Center for Regulatory Risk Analysis and Communication

REGULATORY ALERT

EPA's Action Plan Summary for Chemicals Used in Dyes, Flame Retardants, and Industrial Detergents

nd Communication (RRAC).
PC website at
nce, please contact Sharon

tes, and

ion plans for benzidine
(NPEs). Planned actions
and NP/NPE to EPA's
ction 5(a)(2) for all three
ated to EPA's Toxics
ubstances.

s, paints, printing inks,

National Aeronautics and
Space Administration

Principal Center for Regulatory Risk Analysis and Communication

REGULATORY SUMMARY

Proposed Rule: Transportation of Lithium Batteries

This information was prepared by NASA's Principal Center for Regulatory Risk Analysis and Communication (RRAC PC). If you have further questions or need assistance, please contact the RRAC PC Manager, Sharon Scroggins (256-544-7932, sharon.scroggins@nasa.gov).

Executive Summary

On 11 January 2010, the U.S. Department of Transportation's (DOT's) Pipeline and Hazardous

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Materials Obsolescence: Regulatory Risk Management

Regulatory Early Warning System

- **Agency-wide <u>regulatory analysis and communication</u>**
  - Review, track, analyze emerging regulations
  - Evaluate potential impacts to both Programs and Facilities
  - Communicate significant regulatory changes to the NASA Community

Risk Reality Check

- **<u>Collaborate with NASA technical community</u> on regulatory risk analysis and interpretation**

Proactive Regulatory Risk Mitigation

- **<u>Represent NASA interests to regulatory agencies</u>**
  - Advocate with regulators during rulemaking efforts to mitigate mission risks
  - When necessary, work with NASA technical community to seek regulatory relief

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Changing Regulations Can Drive Program Risks

But how do you know…?

Toxic Substances, REACH

Hazardous Air Pollutants

RoHS

Greenhouse Gas Restrictions

Ozone Depleting Substances

Ambient Ozone Regulations

Changing Regulations Can Drive Program Risks

But how do you know…?

ASK!

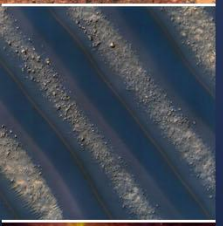
Collaborating with the technical experts is the best way, and often the only way, to know whether a regulatory change represents a risk for a particular program or facility

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Changing Regulations Can Drive Program Risks
Examples

RISK: Restrict operations or right to operate

- Alter operational activities
  - High-efficiency spray equipment
  - Quantities of thinner allowed for coating application
  - Add protective equipment requirements
- Limit where, when, or how operations can take place
  - In spray booths rather than “in the field”
  - Restrict timing of tests or launches due to emissions control requirements
  - Require dipping or brushing instead of spraying



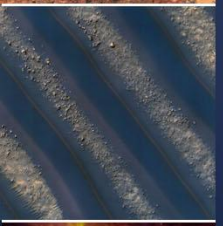
PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Changing Regulations Can Drive Program Risks *Examples*

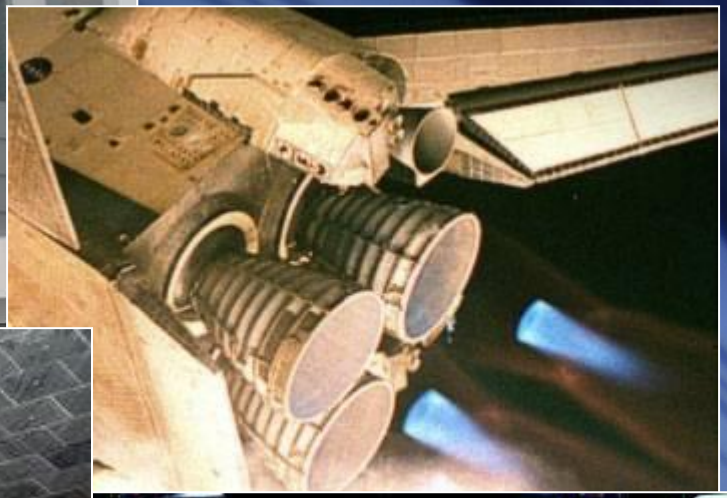
RISK: Availability and usage of materials

- Phase out or phase down production
  - Ex: Stratospheric Ozone (Montreal Protocol)
    - ➢ Major replacement efforts for precision cleaning, foam blowing, fire suppression, heat transfer
  - Ex: Greenhouse Gases (Possible future requirements)
    - ➢ Potentially could restrict production, usage and availability of hydrofluorocarbons, hydrofluoroolefins, SF6, other high GWP fluids

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION






PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Changing Regulations Can Drive Program Risks *Examples*

RISK: Availability and usage of materials

- Manufacturers voluntary terminate production due to public opinion or to minimize regulatory burden
  - Ex: Brominated Flame Retardants (U.S. Toxics pressure, EU Restriction on Hazardous Substances)
    - Polybrominated diphenyl ethers (PBDEs) essentially phased out in the U.S.
    - Because present as an additive, may not see formulation change in material safety data or be notified
  - Ex: Tin/Lead Solder (Restriction on Hazardous Substances)
    - Still available in the U.S., but components are increasingly produced with lead-free solder and electronic finishes.

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Lead-Free Solder Impact

RoHS

Prohibition of lead in solder and other electronics applications in EU

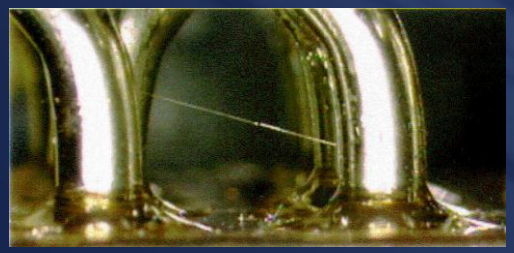
Global electronics vendors eliminating most uses of tin-lead solder and lead-based finishes

Many of the lead-free alloys have a high percentage of tin or are pure tin

For most consumer applications, performance of lead-free electronics is acceptable

Space vehicles, unfortunately, can tell the difference...

Lead-Free Solder Impact *(concluded)*



"Tin whiskers" growing from some pure tin applications are more prevalent in space applications and have resulted in several confirmed satellite failures…

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Changing Regulations Can Drive Program Risks
Examples

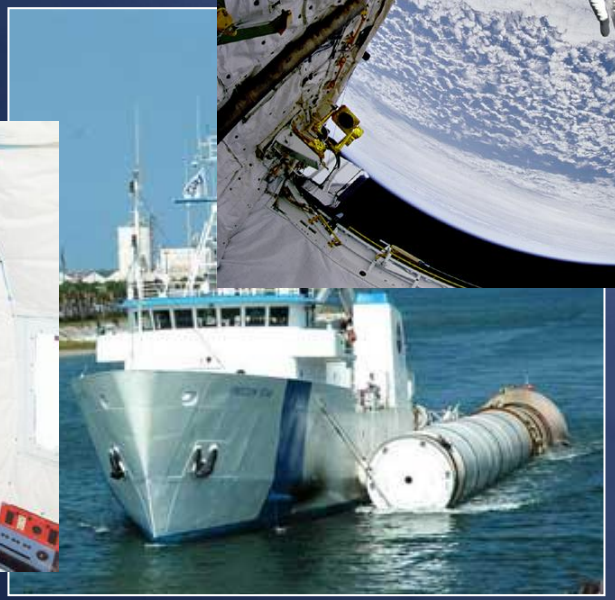
RISK: Availability and usage of materials

- Regulatory changes may drive or require material replacement efforts
  - Replacement costs – usually higher for human-rated systems
  - Schedule impacts – usually lower with early warning
  - Potential pedigree, compatibility or performance issues

Changing Regulations Can Drive Program Risks
Examples

RISK: Availability and usage of materials

- Ex: Coatings (Ambient ozone air quality rules, hazardous air pollutant restrictions)
  - ➢ Can limit coating content of volatile organic compounds and hazardous air pollutants, forcing substitution
- Ex: Numerous raw materials and formulated products (EU REACH)
  - ➢ Usage of certain substances will be limited or eliminated



PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Materials Obsolescence: Regulatory Risk Management

Regulatory Early Warning System

- **Agency-wide <u>regulatory analysis and communication</u>**
  - Review, track, analyze emerging regulations
  - Evaluate potential impacts to both Programs and Facilities
  - Communicate significant regulatory changes to the NASA Community

Risk Reality Check

- **<u>Collaborate with NASA technical community</u> on regulatory risk analysis and interpretation**

Proactive Regulatory Risk Mitigation

- **<u>Represent NASA interests to regulatory agencies</u>**
  - Advocate with regulators during rulemaking efforts to mitigate mission risks
  - When necessary, work with NASA technical community to seek regulatory relief

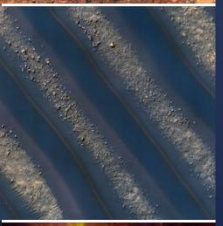
Regulatory Risks Must Be Proactively Managed

- Communicate environmentally-driven materials obsolescence risks and mitigation options to management
- Possible mitigation options depend on the criticality of the at-risk material and how early the risk was identified; options could include:
  - Accepting the risk – may be appropriate for short-term materials needs
  - Investigating substitution or whether the material can otherwise be eliminated
  - Pursuing regulatory relief – alternate requirements, exemptions
- When necessary, communicate regulations-driven mission risks to regulators
  - Mission-critical technical performance or safety-related factors must be considered
  - Collaboration with regulators can produce effective, innovative regulatory solutions

PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Regulatory Risk Analysis and Communication: *Things to consider…*

- Recognize that the requirements of programs and supporting facilities CHANGE and those changes can affect the applicability of regulatory requirements
- Don't assume there is no risk from a regulation or other requirement just because it doesn't appear to directly affect your operations; remember that you rely on your SUPPLY CHAIN
- Stay involved in the technical community or get to know them; they are the people who know whether a "potential impact" is actually an "issue"
- For potentially mission-critical impacts, make sure the information gets to the right person or organization
- In determining potential impacts, be twice as conservative as you initially think is reasonable



PRINCIPAL CENTER FOR REGULATORY RISK ANALYSIS AND COMMUNICATION

Questions?

If you have questions, suggestions, or need further information, please contact:

Sharon Scroggins
RRAC PC Manager
256-544-7932
sharon.scroggins@nasa.gov